

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Request For Declaratory Ruling By)	WT Docket No. 07-121
Wireless Strategies, Inc. Regarding)	DA 07-2684
Coordination Of Microwave Links)	
Under Part 101 Of The Commission's)	
Rules		

Comments of Comsearch

Comsearch, a division of Andrew Corporation specializing in spectrum management of terrestrial microwave, satellite, and mobile telecommunications systems, hereby respectfully submits the following comments in the above captioned docket.

Wireless Strategies, Inc. (WSI) “asks the Commission to issue a declaratory ruling confirming that a Fixed Service licensee is permitted to simultaneously coordinate multiple links whose transmitter elements collectively comply with the Commission’s antenna standards and frequency coordination standards.”¹ “Wireless Strategies seeks a ruling that a licensee may use antennas having distributed elements to operate links, in addition to the main link, subject to conditions that (1) all radiating elements together conform to the applicable antenna radiation pattern in Section 101.115, and (2) all links are successfully coordinated.”²

¹ WSI Petition for Declaratory Ruling (Petition) at p. 1.

² Petition at pp. 7-8.

We believe that the operation described by WSI cannot by definition comply with the §101.115 antenna standards, and cannot comply with the §101.103 coordination requirements, and that therefore the Commission must reject the petition.

Furthermore, even if the Commission were to issue the declaratory ruling requested by WSI, the described operation violates a number of other FCC rules and policies. A rulemaking proceeding would be required to make all of the changes necessary to allow the operation WSI proposes.

The Operation Described by WSI Cannot Comply with §101.115 and Would Not Accomplish Proper Frequency Coordination Under §101.103

The antenna standards set out in §101.115(b) describe radiation suppression requirements as a function of off-axis discrimination angle. From this definition it is impossible, strictly speaking, for emissions from multiple distributed “antenna elements” to collectively comply with the standards. There would be distinct discrimination angles from each of the elements, so for the standards in §101.115(b) to make sense, it is necessary to treat each element as a separate radiator.

Only at a significant distance from the “distributed antenna” would the distinct discrimination angles converge and make it possible to see the various elements as a single antenna. But antennas of multiple licensees are located close together as a matter of course in frequency coordination, so if WSI’s distributed elements and main antenna are seen as a single antenna, we are left with the possibility that another

licensee's antenna could operate *within* WSI's "antenna". The antenna standards of §101.115 would be meaningless in such a situation.

WSI says "the totality of all emissions from the multiple elements must lie within the permissible RPE of the main link antenna"³ and presents Figure 5 showing an area circumscribed by "Maximum Antenna Power (RPE)".⁴ This analysis improperly assigns an area to the RPE requirements. Whereas WSI portrays the DREs as being deployed within an "RPE Area" around the main antenna, it must be recognized that the antenna RPE requirements of §101.115 do not have any dimension of distance or area attached to them. The boundary of WSI's Figure 5 can only be understood to be a particular interference power level into a hypothetical receiver located at any of the points. But the distance along a particular azimuth necessary to produce a certain interference level at a hypothetical receiver is a function not only of the directional gain of WSI's antenna but also of the power transmitted, the directional gain of the other licensee's antenna, the antenna heights, and the path loss from interfering transmitter to victim receiver. This distance could be large (for co-channel operation with antennas aligned towards each other, for example), but it could also be very small. Another licensee's antenna could be within the area of WSI's DREs, and as the distance between a DRE and another licensee's antenna might approach zero, the transmitter power of the DRE would have to be reduced to an arbitrarily low level to satisfy the condition that the total interference received by the other licensee's antenna would be the same as the

³ Petition at p. 6.

interference received from the main antenna alone. WSI has to satisfy the condition that its DREs should not cause any additional interference at all points - even those adjacent to the DREs - not just at points that are far away. In short it is necessary to perform the standard coordination calculations from each main antenna and DRE to determine whether the interference into another licensee's antenna meets the objective.

Because it is necessary to evaluate the DRE transmissions in terms of the total interference caused, "concurrent coordination" apparently means that WSI wants to conduct its own unilateral coordination analysis against other licensed and proposed stations and use the results to set the transmitter power of its DREs. But Part 101 coordination is a bilateral process where the other licensees should be afforded a chance to conduct their own analysis of WSI's system parameters. The coordination of another licensee's new station in the area might require the power of one or more DREs to be reduced. WSI wants other licensees to trust that its concurrent coordination will set and adjust the DRE powers properly. Instead the Commission should affirm that bilateral Part 101 coordination and FCC licensing is the proper mechanism to ensure that other licensees' facilities are protected.

WSI's Proposal Is Not a Legitimate Implementation of Smart Antennas

As described in the petition, WSI's DREs are not part of a smart antenna system and should be treated as separate radiators for the purposes of antenna standards, frequency coordination, and licensing. WSI says "A smart antenna is an antenna system that combines an antenna array with a digital-processing capability to transmit

and receive in an adaptive spatially sensitive manner.”⁵ We agree that a smart antenna is an array of elements whose emissions (power and phase) are controlled to form beams in desired directions and with particular characteristics.

Having invoked in the petition the notion that its system uses modern smart antenna technology, WSI then describes operation where it will implement communication between distributed radiating elements (DREs) and the main link antenna. The communication is taking place *within* the supposed smart antenna without the necessity of any mutual power or phase relationship among the elements beyond perhaps the use of time slots for TDD. Antenna elements that are sending signals with independent information back and forth are not working in concert to form beams as they would in a smart antenna. So while WSI wants to portray this as an implementation of modern smart antenna technology, the “elements” of the “smart antenna” are simply additional radiators that should be treated as such.

For point-to-point service, which is the basis for licensing the system, there is no perceptible benefit to distributing antenna elements over a wide area since at microwave frequencies a highly directional beam can be formed with an antenna of limited dimensions⁶, whether it is a dish, horn reflector, panel, or other type. Controlling and feeding antenna elements at distributed locations would only complicate matters. Thus the rules that prohibit antenna elements from being widely

⁵ Petition at p. 4.

⁶ Typically 1 to 12 feet in diameter, depending on frequency.

distributed over an area are not restrictive in the sense of preventing use of a modern technology that would be beneficial for point-to-point service. Although we do also have reservations about the use of smart antennas for point-to-point service because the variable patterns may be difficult to take into account in the interference calculations, smart antennas for the point-to-point microwave bands could be designed in units small enough to be described by a single set of site coordinates.

The WSI System Creates as Much Interference As Possible

WSI portrays its system as making additional benign use of sidelobes around a needed point-to-point link. However, in the links it has licensed so far, WSI has used parameters that create as much interference as possible under the maximum limits set forth in the rules, presumably in order to carve out a protected service area for its underlying point-to-multipoint operation. According to WSI, “Spectrum in the areas represented by the transmitter side lobes is presently unused by the licensee. Others attempting to use it would fail in coordination, and if they persisted, would receive or cause interference. In short, this spectrum is wasted.”⁷ The claim that other licensees cannot re-use a frequency in close proximity to a licensed link is wrong; nevertheless, without any support WSI makes this supposed waste of spectrum a foundation of its petition. But licensing the parameters that would cause the most interference to others does make sharing more difficult, and this appears to be WSI’s strategy.

⁷ Petition at p. 5.

A licensee is not entitled to use the maximum EIRP (usually 85 dBm) on every link; instead licensees are expected to use “the minimum amount of power necessary to carry out the communications desired.”⁸ The median EIRP used by 27.5 to 30 MHz bandwidth digital microwave transmitters in the 5925-6425 MHz band on links in the 20 to 50 km range (comparable to WSI’s links) is 68.1 dBm. Figure 1 shows the distribution. But WSI has licensed every one of its transmitters at the 85 dBm maximum limit.

Fixed Service licensees are required to specify the antenna model(s) and radiation pattern(s) used. Since the §101.115 standards are minimum performance levels, patterns of real antennas meet the standards at their worst points while exceeding the standards, perhaps greatly, over most of the azimuth range 0 to 360 degrees. Using the guaranteed RPE performance of actual antenna models in frequency coordination provides a great advantage versus using default or minimum level performance. While claiming the links it has licensed so far are part of a “Phase 1 roll-out” that “uses certified antennas ...”⁹, WSI has coordinated and licensed the links using the Standard A antenna pattern.¹⁰ As an example of the harm of this approach, the gain of WSI’s Standard A antenna is $38.2 \text{ dBi} - 55 \text{ dB} = -16.8 \text{ dBi}$ for directions between 100 degrees and 260 degrees from boresight. The gain of an ultra high performance 6 foot diameter antenna would be $38.8 \text{ dBi} - 75 \text{ dB} = -36.2 \text{ dBi}$ for the same sector. So WSI is causing

⁸ 47 C.F.R. 101.113(a).

⁹ WSI Reply to Verizon’s Petition to Deny, April 24, 2007.

¹⁰ For frequency coordination, WSI has distributed an RPE for the antennas indicating itself as the manufacturer. The RPE shows the §101.115 Standard A breakpoints.

19.4 dB more interference in these directions than it might need to for purely point-to-point operation.

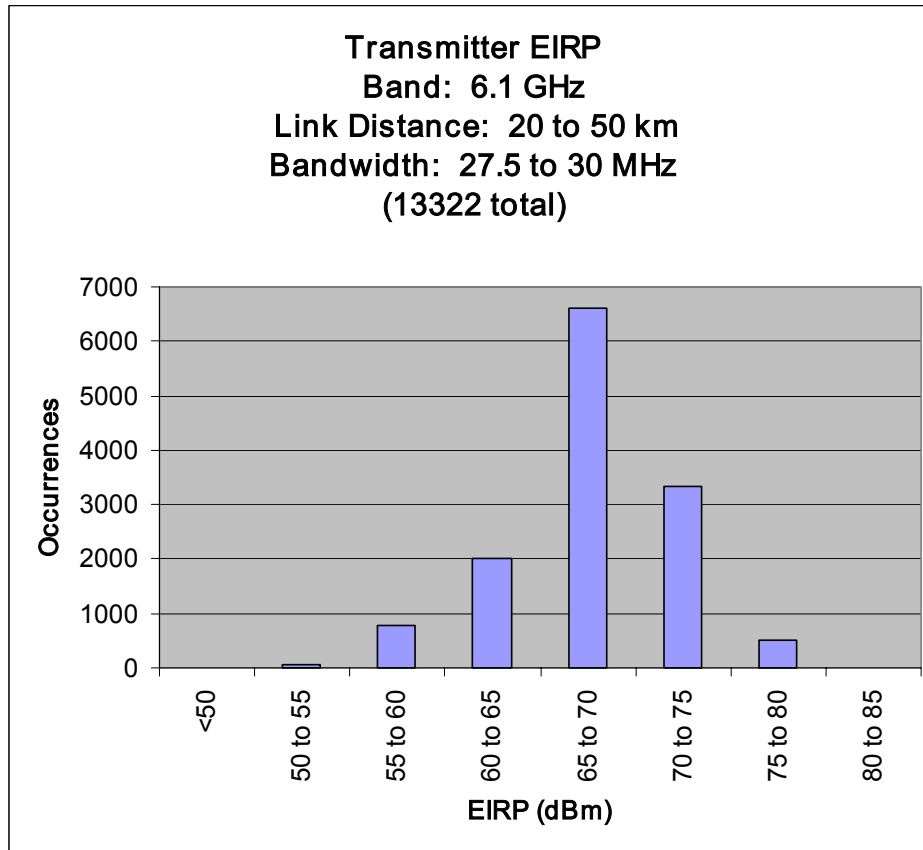


Figure 1: EIRP Distribution for Digital Transmitters in the 5925-6425 MHz band (Comsearch data 6/30/07)

Further WSI's licensed EIRP is at least 16 dB higher than the median for the band. So combining the high EIRP with the minimal antenna performance, WSI is causing in excess of 30 dB more interference in these directions than necessary if all it wanted to do was communicate between Point A and Point B. As a specific example, our calculations show that with space diversity, WSI's BA Tower (WQHD218) – Mt Laurel (WQHD217) link could meet 99.9999% reliability with EIRP less than 60 dBm.

Licensing the highest EIRP and worst antenna pattern would allow WSI to transmit a correspondingly higher EIRP in those directions from its DREs and still claim that the interference caused is the same or less than that caused by the main antenna. WSI has selected parameters that create much more interference than would have been necessary for point-to-point operation (and in fact as much interference as possible under the maximum limits of the rules) so that its prospective DREs will be able to operate with as much power as possible. If the Commission were to approve WSI's operation, it would have to reconcile this predatory behavior with the rules that require cooperation among licensees in the shared point-to-point bands to manage and avoid interference.

WSI's Proposal Is In Conflict With A Number of Other FCC Rules and Policies

WSI claims: "The Rules do not specify the location of a path's transceiver or the location and RPE of an antenna's radiating element(s). The reason the location and RPE of the antennas radiating elements present no coordination problems is because the physical location has no effect on interference as the interference level "I", used in the calculation of the ratios C/I or T/I at the input of a victim receiver, is the totality of the interference from the source antenna system."¹¹ However, the Rules state: "Applications for stations at fixed locations must describe each transmitting antenna site by its geographical coordinatesGeographical coordinates, referenced to NAD83,

¹¹ WSI reply to FWCC letter, April 23, 2007.

must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude.”¹² And: “Each application in the Private Operational Fixed Point-to-Point Microwave Service and the Common Carrier Fixed Point-to-Point Microwave Service must include the following information:Transmitting station coordinatesTransmitting antenna(s), model, gain, and, if required, a radiation pattern provided or certified by the manufacturerTransmitting antenna center line height(s) above ground level..... The position location of antenna sites shall be determined to an accuracy of no less than ± 1 second in the horizontal dimensions (latitude and longitude) and ± 1 meter in the vertical dimension (ground elevation) with respect to the National Spatial Reference System.”¹³ Furthermore the application Form 601 collects antenna height which is described in the instructions as “height of the final radiating element”, and the rules have antenna structure registration requirements based on structure height.¹⁴ None of these rules on antenna location and height make sense if the definition of “antenna” is recast to include elements distributed over a wide area. WSI’s view that it is not necessary to specify the locations of its DREs is not a reasonable interpretation of the rules.

In addition Part 101 includes rules that require minimum channel loading and bandwidth efficiency.¹⁵ A basis of a point-to-point application is that the operator needs the requested capacity to communicate between the endpoints. Here WSI would take

¹² 47 C.F.R §1.923(c).

¹³ 47 C.F.R §101.21(e).

¹⁴ 47 C.F.R. §1.923(d).

¹⁵ See, for example, 47 C.F.R §101.109(c) and §101.141(a)(3).

the capacity ostensibly needed for point-to-point communication and parcel it out to PMP users. One has to question whether communication over the point-to-point link is even a true objective or simply a device to allow PMP operation. The Commission would have to revise the loading efficiency rules to deal with an operator licensing capacity on a link but using it elsewhere.

WSI's system also appears to involve the following conflicts:

- To the extent it is successful in crowding out other licensees by creating as much interference as possible, the WSI system may be seen as creating mutual exclusivity that would trigger the Commission's obligation to auction the spectrum.
- The individual DRE antennas may not meet the §101.115 antenna pattern requirements
- The licensed 85 dBm EIRP will be used over short DRE links whereas these links may be entitled to a much lower EIRP under §101.143(b).

The rules for the point-to-point microwave services have been developed with the understanding that the antennas are located at individual fixed locations and the communications on each link are to take place between the two endpoints. Using the licensed endpoints as base stations for point-to-multipoint operation with unlicensed DREs renders many rules nonsensical and thus these many rules require modification to approve WSI's method of operation.

Conclusion

The Commission should reject WSI's petition because neither of the rulings specifically requested is justified and because a number of other rule changes would be required to operate the WSI system.

Respectfully Submitted,

COMSEARCH

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A handwritten signature in black ink, appearing to read "William W. Perkins", written over a horizontal line.

Prepared by: _____

William W. Perkins
Principal Engineer

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